"Sectio Cadaveris hodie hora solita"—such is the inscription that stares every medical student in the face—at every one who takes the trouble to examine the ticket that often hangs on the first landing of the great staircase of the Royal Infirmary. For my own part I had often seen this ticket, once, and attended the sections too, without ever troubling myself to think what it all meant: for it never occurred to me that it really did mean anything more than the mere examination of a dead body. Thoughtfully ascending the stair one day, I again saw the familiar ticket—"Sectio Cadaveris hodie hora solita." But this time it was no matter for indifference. It suddenly occurred to me that it would require but a very simple change in my own corporeal condition to place me in the same circumstances with the defunct subject of this pithy sentence.
The more I pondered upon these few words, the less satisfied I felt with my own reasoning. Again and again did I put to myself the question: How do these pathological investigations bear upon my profession. The words continued to haunt me—"Sectio Cadaveris." In morning, noon, and night, and even worst of all-night, I began to think there ought to be something in it. "Sectio Cadaveris?" there must be something in it. Finally, I came to the conclusion that there was something in it.

The placid smile of death rests upon the face that once was lighted up with sympathy and love. But now its substance is of less use than a piece of wax-work! The lease is out, and the clay must be rendered up to mother earth. Pray God that the spiritual tenant is ready to depart. "What did he die of?" is the question every one asks with a certain depth of interest measured by the chance that awaits himself. Of consumption! Ah, then there could indeed be no hope! Poor fellow!—and the citizen of the world goes off with a chuckle because his family is not threatened by little dreams of the "faint heart" that will soon cease to beat within his breast! However, all this has nothing to do with our subject and so at once to the matter.
For what purpose are the numerous post-mortem examinations made? Certainly for some excellent one. Not mere curiosity alone could stimulate any man of right feeling to undertake a duty at once so ungrateful to the finer sense, and repugnant to the best feelings of our nature. There has been implanted in the mind of all human beings a strong desire for the continued enjoyment of life and health; and this desire may be ascribed the surprising amount of interest which all of us take in the mode and causes of the dissolution of others. Everyday experience teaches us that when a machine refuses to perform the work for which it was designed, a careful examination of its structure will always furnish us with a most satisfactory cause. Applying this principle of investigation to the animal mechanism there cannot be a more feasible plan for ascertaining the cause of death in human beings. Having once ascertained the real nature of maladies, physicians may hope to palliate or cure cases otherwise irretrievable. But the human body is not like an inanimate machine which may stop...
working and then recommence as soon as it is repaired: on the contrary, theistes
of us have only a few years to live, and
then our bodies in contempt of all efforts
to keep them in good order, will go to
complete wreck, become melted and dis-
integrated, and finally resolved into the
mineral constituents of the organiz able world.
The atmosphere becomes loaded with various
vapours; the soil becomes enriched with
earty salts; and the body of a Brutus has
become food for the next generation!

Who knows how long people would
live if they only had their way of it? Per-
haps even Old Parr was dissatisfied? Yet
it must be a dreadful thing to live very
long and to see one generation after another
spring up, and blossom, and wither, and die
like so many know drops and lilies. A
great number of people however think
that they die a good deal sooner than they
ought; and perhaps Solomon's observation
(merely an incidental one) about the duration
of human life being seventy years might give
such people more than a shadow of reason
on their side. But then the lives that some
people lead! - No wonder they die at thirty
and forty years of age. Still as a vast majority of the human race do not live to even seventy years, and as immense numbers appear to be destroyed by avoidable or remediable diseases, it comes to be a question of the utmost importance to all of us. "How may human life be prolonged upon the easiest and most certain terms?" and to the discussion of this question the following pages will be devoted. According to some philosophers any attempt to prolong human life is based in falsity. These are the philosophers who believe all things that take place to have been inevitable and certain from the commencement of the world. In the case of these gentlemen the most extraordinary thing is the capability of satisfying the cravings of hunger, since it could be proved to a demonstration that food is quite unnecessary if only one resolves to live and die by pre-ordination. In my opinion it is not by the light of reason that we can expect to be guided in such an affair as the attempted preservation of life. Nature (Providence) has furnished us with certain appetites, certain instincts, in the suggestions of which we are also furnished with the best of all guides for our conduct in regard to
the preservation of the house we live in. The instinctive desire to protect from danger those who are dear to us furnishes a sufficient warrant for all efforts made either towards the cure of disease or the preservation of life. The existence of instinct proves the necessity for it: the necessity for its existence implies a command to follow its suggestions. In fact if disease were not at all a remediable thing, there is no reason to believe that any instinctive suggestions for its treatment would ever have been afforded. It is certain that reason alone is a very dangerous thing in which to place our trust.

Now in considering how life may be most efficiently preserved, it will be necessary to bring forward in a prominent manner the great laws by which the development of organized beings has been regulated in true past, so that whatever the past experience of the world elicited may not be lost to the children of this generation.

There is not I believe any other class of men more entirely digested in their own opinion than our Commentators on holy writ. Only leave the matter in their hands, and it will be determined to a nicety, how & all geological phenomena
are quite consistent with theories that assign to this earth a past duration of scarcely six thousand years—this to include the dark ages of course. What is worst of all however, they lay the entire blame upon Moses simply because they choose to explain things inexplicable according to their own fashion. No one ever had, & no one ever will have, the most remote conception of the space of time corresponding to the epochs or days that are made mention of in the biblical history of this world's creation: quite as well might they be considered equivalent to many thousands of years, which, in the estimation of the Eternal might have but the duration of a single day. If therefore, presuming to set aside the commonly accepted ideas in regard to this world's history, we believe the fossiliferous strata in their ever-varying qualities, to represent the organized beings of former ages, then, for my own part I consider the whole science of geology as one gigantic post-mortem examination from which may be derived abundance of material both for thought and instruction.

Deeply buried in the bosom of this earth lie the mineral remains of whole dynasties of organized beings, whose more subtle elements...
have been dissolved, disintegrated and diffused throughout the atmosphere, from which again, generation after generation have derived their earthly tenements. Indeed, fossils are only the tangible remnant of former generations; they give but a faint idea of the forms and powers possessed by the beings peculiar to ages so remote that the present one from the creation of Adam is scarcely to be considered as a great-grand-child when compared with them. After the most elaborate research among the fossil treasures of the earth—after exhausting our powers of observation with the number and minuteness of the remnants which they exhibit, what lesson are we taught—what moral can we draw from this petrified page of history? So one will say that the attentive perusal of this mighty record is capable of affording a rich harvest to the student of nature. Organic life is one continual process of change affecting the material world, the ultimate elements of which are as eternal as the soul itself. But more than this, it is susceptible of proof that the continued existence of all organized and living beings, whether they be plants or animals is entirely dependent upon the dissolution of their progenitors: and the death of these is but the re-
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Reduction of borrowed matter to the store-house of nature. The animal and the vegetable kingdoms are the two antagonistic powers that struggle for supremacy in this earthly territory: but unlike all other opposing forces their interests are inseparably dependent on one another. The vegetable kingdom is the antagonist of the animal, since the very existence of the former upon the dissolution of the latter is susceptible of daily hourly demonstration. Yet it is through the instrumentality of vegetables alone that the earth and atmosphere can blend their elements and create food sufficient for the nutrition of animals. Carbon, hydrogen, oxygen, and nitrogen are the cardinal elements of the organic world. The atmosphere is the great medium into which, in the shape of carbonic acid, water, and ammonia, these elements are continually poured. The putrefying bodies of dead animals load the atmosphere with noxious vapours which are poisonous to animal life; but on these poisons it is that vegetables feed so luxuriously and so well. Oxygen is the poison that threatens the vegetable organism with speedy destruction, and as such it is continually exhaled. But no sooner does it enter
the atmosphere than it is at once absorbed by animals which are incapable of living without it. — Thus, in theory at least, the duration of the organic world is eternal, yet as respects the individuals that compose it, life is enjoyed for but a brief period. For the perfect development of all organized beings, it is necessary that they should have in their constitution a large amount of vaporizable matter, by which they may continually assist one another with a continual interchange of their effete elements. As, however, plants and animals grow old, the mineral and non-vaporizable elements accumulate within their tissues, whilst the more ethereal constituents become diminished in relative proportion. Thus they become unfit to favour the advancement of the great system of organization and accordingly surrender up the material which they had monopolized during the period of their existence.

Now, as the continual production of new beings is an essential feature in the scheme of creation, it becomes a question of some importance to determine in what manner this work is accomplished. In the reproduction of plants and animals, were it only necessary that the bodies of their predecessors should melt
and become resolved into their pristine elements—
the vaporous part rendered up to the atmosphere
the mineral part restored to the soil—then
might it be possible for animals and vege-
tables to spring up in such confusion and
multitude as would render creation only
another name for chaos itself. But on the
contrary we observe everywhere the existence
of the most perfect regularity and distinctness
in all the works of creation—a regularity which
is the more surprising as it extends even to the
minutest details of arrangement and structure.
Although indeed it is true in a general way
that all organic life has originated from
material which at one time possessed all
the qualities of a perfect fluid, yet it is
equally true that much more is wanting than
mere fluidity in the formative material that
the process of organization may become fairly
established. If that process could take
origin whenever the necessary materials
were supplied, then creation might be
only the accidental aggregation of the mole-
cules of matter. But all the facts with
which we are constantly supplied point
to an entirely different explanation—that
namely which holds for its very essence.
a belief in the existence of germinal centres. Not merely for each division and subdivision of the animal and vegetable kingdoms, but for all the varieties, however numerous, that may be met with throughout the arrows of Nature. It may be objected to this view that the four or five elements which appear to constitute the chief, if not the only components of nuclear bodies, could not arrange themselves into so many thousand of forms as would be required to carry out this scheme of organization from germinal centres. This objection however is a trifling one. All our knowledge in regard to the ultimate molecules of matter would lead to the belief that these are too small to be conceived of by mind constituted like ours: but all the researches of modern chemistry tend to the proof—i.e. such were possible—that the proximate atoms of organic bodies actually consist of multitudes of the ultimate ones—of such multitudes indeed, as might by their peculiarity of arrangement produce a diversity of compounds nearly innumerable.

I do not feel convinced that my ideas in regard to this subject have
been stated either so pointedly or so clearly as I could have desired; and therefore it may be as well to recapitulate what I imagine to be of such vital consequence.

First.- The ultimate atoms of matter are too minute for our comprehension.

Second.- Even the proximate atoms which enter into organic bodies are too small to be defined by our most perfect instruments.

Third.- Although so very small, these proximate atoms each contain a multitude—perhaps hundreds—of elementary molecules.

Fourth.- Although perhaps only five varieties of atoms (Carbon, Hydrogen, Nitrogen, Oxygen, Sulphur) do really enter into the constitution of oleaginous and albuminous matter, yet these may assume many forms and possess many qualities for which chemistry can afford no explanation whatever.

Fifth.- The theory of isomerism, when applied to substances so complex as albumen might perfectly account for the existence of millions.
of proximate molecules too small to be subjected to any test available by our senses, and yet possessed of powers sufficient to characterize either animal or vegetable organisms.

Sixth.—Although those who favour the theory of germinal centres especially state that comparatively large nuclear bodies always appear before the dawn of organization, yet such a statement is not called for but to convince those sceptics who require something to look at in order to assent their belief— for directing power may just as easily reside in nuclear bodies of inappreciable minuteness as in those of distinguishable magnitude, since after all the whole of them are merely structureless globules.

Seventh.—Taking into account all that is known in regard to germs, we may fairly conclude that these bodies differ from one another neither in appearance nor in chemical constitution.
but that their peculiarity springs
from the arrangement of their
elementary and proximate atoms
which endows them with qualities
the more mysterious the more
deeply they are studied.

But much more is necessary than mere con-
tact of germs with their fabled life in order that
animate matter may become instinct with
life and spring up in all the varied beauty of
form and structure presented by the numerous forms
of the created world. Heat, light, and the vital
force are the three great agents by whose com-
bined power the molecules of matter become
associated into living structures. In these few
words may be declared the theory of generation
a vegetable germ is deposited in the earth.
by the combined agency of air & moisture acting
under the stimulus of heat, the vitality dormant within it becomes fully aroused: the
soil melts & combines with the elements of the
atmosphere to furnish nutriment; and so the
ergms even of a mighty oak produces its
giant vegetation by the mingling of organization
of earth and air alone. If every little plant
could tell us its own history, it would only
corroborate this statement: that it once existed
partly in the earth, partly in the surrounding atmosphere, and so but for the disturbance excited by an occasional earthquake or whirlwind it would have remained for ages leading the same inactive existence had not a sporule or other vegetable germ seized hold of its elements, melted them down and fed upon them. Vegetable life in its origin at least may be considered as the type of our own: for we are composed of a subtle and a grosser part which remain combined only during the pleasure of our Great Architect. As it is the characteristic power of vegetables to draw their nourishment from the inorganic materials of the earth and atmosphere, so it their destiny to minister to the wants of animals which entirely depend upon them for continuance of life. Considered as agents in the economy of nature, plants are even greater than animals in their original design, for they are the links of connection between the animate and the inanimate world. They raise up habitations, furnish nutriment and supply clothing to the various genera of the animal kingdom; they even drink up the poisons that would obliterates animal existence and speedily manufacture them into fragrant blossoms and delicious fruits. But although indeed all the works of the Creator must appear to us to be possessed of
inseparable perfection, yet one cannot help reflecting how wonderful it is that even the poisons that we cast out of our bodies are made subservient to our nourishment and protection.

Light is the heavenly influence by which the vegetable kingdom exerts its power; light therefore is the emblem of life. "And said, let there be light and there was light," and this significant expression glows upon the inspired page as if its importance could scarcely be declared with sufficient emphasis. Almost every metaphor points to light as the emblem of creative power - the appreciable manifestation of divine agency.

If it be considered then as an established fact that germinal centres are the essential and sufficient nuclei for the development of tissues and organs not less than of genera & species, ought we not to have strong hope that the secrets of organization and development are about to be unveiled? And so having discovered the elementary principles brought into play in the construction of the human frame, we may be able to avert its disintegration. But the more deeply we search, the more shadowy does our knowledge become; for if labour be devoted to the investigation of ova, these bodies whether in
the vegetable or the animal kingdom, do not
differ from one another in any respect appreci-
ciable by our senses. Nor can the chemical
art ever avail the enquirer in determining
the differences that must exist among them.
Even in this age of advancement when chemistry
has made such rapid strides it is notorious
that scarcely two analyses of substances derived
from animal bodies forming their tissues, agree in
their results; and certainly none in the slightest
degree approach the exactitude of microscopic
investigation. And on the other hand animal
bodies composed of many organisms which
could be appreciated by unaided vision, would
not admit of being analysed at all. So one
who has had anything to do with investigations
in embryology can fail to have been struck
with the extremely systematic way in which
the ova of different animals are developed into
individuals of their own species, and this fact
coupled with the absolute impossibility of detecting
any trace of difference among the ova of different
animals, must fill every reflecting mind with the
conviction that, very far short of any discovery that
will lead to the detection of nature's intimate economy,
we are met by a barrier so overwhelming in its very
simplicity that we feel it to be insurmountable.
I have cited the instance of embryology as one in which beings possessing the most opposite conformation are produced from one which, however carefully examined, appear to be identical in physical and chemical constitution; but the same observations apply with equal force to the germinal centres of the individual tissue, which compose the organs either of the human or of any other animal. In all properties which are distinguishable by our senses, the directing nuclei of muscular, osseous, or other tissues, not only appear quite identical with one another, but each of them might, for anything that its appearance would tell to the contrary, be capable of developing an entire human body on its own account. And although the corpuscles, which we are in the habit of terming nuclear or germinal, usually do possess a greater size than the elementary tissues which they are supposed to manufacture, yet mere size cannot be taken as the measure of quality in such corpuscles. Indeed, when we are gazing through a microscope with a power of 500 diameters, it is impossible for us to guess which of the minute molecules under view may, and which may not, yet become the progenitor of countless myriads of highly de
veloped individuals. This difficulty cannot be got rid of by asserting that nuclei usually bear a diameter of two to four thousandth of an inch; for it is sufficiently obvious without any great stretch of imagination that all corpuscles developed from a perfect fluid must have their origin from inappreciable molecules.

There are scarcely within the wide range of medical science any more fascinating pursuits than those of histology and organic chemistry; certainly there are none which are better calculated to allure the young mind with bright hopes of ultimate success and enduring benefit. It is with great reluctance I now bear testimony to the past unfruitfulness of both; not from the investigation of the future can we reasonably hope for results which the Herculean labours of many years have failed to illicit. Certainly our deepest gratitude is due to men who have devoted year after year of their valuable lives in attempting to discover the magic sign under which living things assume their distinctive forms: they have indeed accumulated a vast pile of evidence, one which at a monumental library
may serve for a venerable memorial of
fruitless exertion and a textural history
of the wonders of creation. And now,
having at the conclusion that our first
origin and early life are both characterized
by a mysterious simplicity; and furthermore
feeling convinced that the microscope and
chemical analyses have already done all
that they will ever do to simplify our ideas
and to render them useful, I now proceed
at once to enquire, first: How is the body
nourished until its arrival at maturity;
and secondly, how is it maintained in full
vigour when once it has attained its per-
fected development—these are questions in the
investigation of which many valuable
facts cannot fail to be established.

During intrauterine life the foetus is
nourished with food of such a description
that nothing further is required than its simple
appropriation (assimilation) by the tissues and
organs. Setting aside the minor objections
which can be urged against the absorbing
powers of the placental villi, there can be little
doubt that liquor amnionis in nearly all un-
altered state constitutes the entire nutriment of
the embryo. Yet there cannot be a doubt
but that as soon as the organs of digestion and respiration are fully prepared to exercise their own peculiar functions, they would actually degenerate under a continuance of the same nutriment which has made them so perfect as they are found to be at birth. And here it is to be particularly remarked that a full and vigorous circulation of the materials received from the parent has been going on not only long before the organs of digestion and respiration were blocked out of the general mass, but was coeval with the first dawn of life in the embryo.

And now, when according to some law of periodicity not less subtle to our comprehension than the origin of life itself, the child becomes fitted to sustain an independent existence, observe how delicately its dawning powers are tuck'd. It is evident I think that the animal left its former abode for a variety of reasons which although too numerous to be fully ascertained, must comprehend at least two of high importance, namely, the completed inaptitude of the body for being nourished by liquor sanguinis alone; and the sufficient perfection of organs fitted to supply a nutriment
that will agree better with the requirements of the growing frame. Milk indeed is a fluid but one step removed from liquor sanguinis itself, containing as it does the saccharine, oleaginous, and albuminous constituents of human food so combined with the various salts required for giving solidity to the textures as to render the processes of digestion and assimilation comparatively simple. Why should nature not have furnished a nutriment perfectly identical with liquor sanguinis instead of milk? why indeed, but to accustom the delicate organs gradually to live upon such food as man is intended to consume in his state of perfect development. Again as development exacts for its completion yet another variety of nutriment, more crude in its nature than milk, and as we have an elegant and unmistakable indication of this in the appearance of the teeth, the vegetable and animal kingdoms are taxed to furnish food for man.

In these details regarding the early and more mature systems of nourishment adopted in carrying out Nature's purpose, I have not attempted anything bordering upon originality but at the same time I feel convinced that
were the indications presented by nature followed with sufficient care, and trusted to as implicitly as they ought to be, fewer children would become the hapless victims of improper diet.

Keeping in view that the main-
tenance of the human body, like that of all other animal bodies, depends essentially upon a vigorous supply of blood to all parts of the frame, and considering moreover that the current of the blood is not only the vehicle for all nutritive matter, but the recipient of all waste tissue, it now comes to be en-
quired, first, how fresh nutriment is supplied to, how poisonous matters are removed from this vital stream. The process of digestion rises at once into a high place in our esti-
mation when we come to consider questions like these: for digestion comprehends in reality all processes by which the food of man becomes perfectly liquified & fitted for conversion into blood. It is unnecessary here to enter upon a consideration of the exact mode in which the four chief materials of the food become completely liquified. To name in detail the various modifications of glandular structure that furnish the dissolving fluids to dwell upon the various qualities of the
juices which they afford, would scarcely serve my present purpose: suffice it to say that the saccharine, oleaginous, albuminous, and saline constituents of the food are so disintegrated and dissolved by the salivary, pancreatic and gastric fluids, (aided no doubt by the biliary, Brunnerian and other fluids of the alimentary canal not less than by the entangled atmospheric air) that they become amenable to absorption not only by the villi but by the capillary vessels themselves.

Those portions of dissolved food which are taken up by the capillaries of course at once enter the circulation, but the other portions which are absorbed by the villi are subjected to a peculiar ordeal in the mesenteric glands, (which are believed by some physiologists in Germany to be necessary for the development of the corpuscles of the blood) previously to entering the general current of the circulation. Sanquification, which means the conversion of food into blood is accomplished however by contact with the blood itself and a complete exposure of both to the influence of the atmosphere. The lungs therefore may be looked upon as the organs for perfecting the metamorphosis of inanimate food into
living blood. It is I think evident that the organs which suddenly are called into action at the birth of the child are those more immediately connected with a sudden change in the mode of nourishing the blood: for it must not be imagined that the foetus is not well furnished with blood glands: on the contrary it is well supplied with such organs as are necessary for developing liquor componis: if the digestive organs are only brought into play when a refractory kind of aliment has to be dealt with and when the wear and tear of the system becomes so considerable that new modes of purifying it must be brought into play.

As the circulation carries a store of nutriment to all parts of the body so does it bring back from them the broken down materials which can no longer be of service in the animal economy: and as it is impossible to ascertain the principle upon which dissolved food is absorbed whether by lacteals or by capillaries so it appears almost fruitless to attempt any explanation of the same kind with respect to the removal of wasted tissue from all parts of the body. Even if the...
actual commencements of the lymphatics could be detected no light whatever would be thrown upon the matter, and therefore at present we must be satisfied with such demonstrations as may be observed in the subcutaneous tissue of the erotion of Mamma. But in whatever manner absorption is effected, it is pretty certain that material so absorbed is taken up in a state of perfect fluidity, and that it then undergoes a series of changes comprehended under the title of secondary digestion in the blood itself, and that in this process the oxygen taken in at the lungs plays a very important part. Although we are in the habit of talking about the aerating power of the lungs over the blood, yet it must be recollected that the term aeration is merely a conventional one, and that a plant may be as truly considered to be aerated through its leaves as the blood if an animal is through its lungs, although in the one case the aerating fluid is carbonic acid & in the other oxygen. Aeration of the blood then ought to be considered not one jot less as the excretion of carbonic acid than as the absorption of oxygen.
Still I feel confident that greater importance is commonly attached to the latter than to the former. Of the results of the secondary digestion few indeed are well known. Fibrin is conjectured to be a constant one and its absence from the blood appears to be of worse omen than its presence in excess. Urea and uric acid together with the colouring matters of the urine and other fluids may be mentioned among the nitrogenous products of this process. Carbonic acid and water, the former of which is thrown off in such quantity by the lungs, form the remainder of the products of the disintegration of tissue. There are certainly more than I have mentioned produced even in health, among which may be reckoned oxalic acid (Lehmann); but in disease the number is perhaps greater still, and of these may be mentioned sugar, the cystic and acanthic oxides, as fair examples. Of the bile I need say nothing as its sources and modes of leaving the system are so little understood. All poisonous matter, whether of the ordinary or extraordinary kinds finally reach some mucous surface.
by a proper enumeration.

With respect to the various glands that free the blood of the numerous poisons which contaminate it, I dare scarcely trust myself to speak; the subject is too beautiful to be treated in a cursory manner. I shall content myself with instituting a comparison between the glandular structures that purify and those that enrich the blood. As the whole body may be looked upon as consisting of two vast membranes, the one in contact with the blood and lymph (vascular and absorbent) the other in contact with the atmosphere and the food (mucous and cutaneous), so by the accretion of the former recesses are formed (spleen &c.) in which the liquor lenquinius becomes developed into the corpuscular elements of the blood; by the accretions of the latter recesses are also formed (liver, kidney, mamma, &c.) in which the epithelial covering changing its ordinary nature no doubt under the influence of peculiar centres of nutrition draws from the blood secretions of the most varied quality and ultimate purpose. As the various
fluids belonging to the cutaneous system secrete fluids of the most varied quality so perhaps may the various sacculations belonging to the vascular system elaborate different portions of the blood. Each series of sacculations possessing its own peculiar nuclei. In this way perhaps we may account for changes in the composition of the blood (leucocytanthemia) thought to be connected with peculiar states of the system.

And now let us sum up the evidence in regard to the development and maintenance of the human body, and especially declare the principle as far as they have been ascertained upon which these have hitherto been conducted. In its first form a simple vesicle of globular shape in fact a sac containing nutriment fit for the production of an animal. As time passes on the little bag of nutriment is surrounded by a triple layer of cells manufactured from its own substance the layer in contact with the organism able material (yolk) forming a beautiful type of the future cutaneous nervous systems.
Presently, an oval space in the germinal membrane is marked out and decided upon as the proper locality in which the process of development may be accomplished; and here indeed a marvellous change is quickly wrought. The middle or vascular layer of the germinal membrane grows rapidly, and by changes in its cells becomes a vascular network, receiving nourishment on the one hand from the reservoir of nutrient, protection on the other hand from the outer layer. Even in this stage of its progress the foetus may be looked upon as a chart exhibiting the future course to be pursued by nature in perfecting this masterpiece, and with this chart to guide us we are soon led to the knowledge of the circumstances required for the nourishment of the body. The mucous layer is the type of the intestinal canal, and the yolk which is in contact with it and which it rapidly absorbing, represents the condition into which all nutrient ought to be reduced previously to absorption in the independent condition to be enjoyed by the perfect being. The vascular layer represents the whole vascular system by which the nutrient once absorbed into it becomes distributed in sufficient quantity and with sufficient rapidity to supply the food required by the tissues whilst it maintains them in
healthy vigour. Finally, the serous layer represents the organs necessary for supporting, uniting, and protecting the frame, and also for bringing it, through a nervous system, into communion with the external world. But as the integument which is formed becomes at least perfectly continuous with the mucous layer, the organs now mentioned may all of them be looked upon as tissues interposed between two enormously ramified membranes which are perfectly distinct from one another. And these two carry on the business of nutrition, the one preparing the material and the other distributing it. The glandular structures must always be looked upon as organs produced in addition, as it were, to the original plan—as details rendered necessary by the peculiar circumstances under which the animal when independent exists—and really not essential to the theory of the animal economy. And this will at once be obvious when it is considered that a gland is neither more nor less than a still further ramification and peculiarly intimate connection between the basement membranes of the vascular and mucocutaneous systems. It is scarcely necessary to add that the organs furnished for the absorption
of the nutrient into the blood are in reality just the converse of those which are destined to filter materials out of it. The nuclei are placed between the basement membranes of the mucous and vascular systems in the one case on the free surface of the mucous system only in the other.

Considering the narrow limits of an inaugural dissertation it would be improper to devote more space to the subject of development than I have, more especially since I conceive the theory of this process to be better exhibited by the three layers of the germinal membrane previously to the time at which they become thickened, contorted, partially amalgamated or split up to form the various organs which compose the human body than by a detailed examination of these. There is one point however which I consider as deserving of the most earnest attention, namely the change which occurs during the development of the vascular system. First of all we have merely a layer of cells which in all probability are endowed with peculiar properties connected with the distribution of nu-

triment; and the mode in which these cells become changed with blood-vessels is very little
understood—for Kölliker's view is really untenable. This part of the process therefore it is scarcely necessary to do more than hint at. But in its subsequent development, the vascular system exhibit the most surpassing intricacy and beauty. Such indeed is the extent to which its formation is carried, that the whole body may be looked upon as a great vascular network walled in by nervous, muscular, osseous, or other tissue according to the organ which they permeate. Finally the preparation which are made during foetal life, for commencing at once the business of circulation in all its departments are truly astonishing. For although, although no doubt the foetal state throughout is one of preparation, yet I imagine the preparation and readiness for instant use of such immense vascular expansions as those of the lungs, the absorbent system, and all the blood glands, to be more striking than any other example that could be chosen.

As to the maintenance of the body in a vigorous state, it is evident I think that perfection in the vitality of the blood is the condition of all others most essential to the well-being of the tissues. And when we come to consider the many causes of contamination,
to which the blood is subjected through the lungs and through the intestinal canal, it is surprising that its qualities remain so little affected. Any attempt to account for this power of self-preservation must be unavailing but at the same time one cannot pass over this subject without remarking how well on all sides the vital stream has been defended; for however delicate the membranes which contain the blood may appear to be, it is quite certain that all materials entering it must traverse through at least several laminae of different qualities and probably also having peculiar powers of resisting the transmission of injurious matter. And on the other hand, should poisons begin to contaminate the blood, rarely some gland will be ready to filter it out. In order to furnish the circulation with proper material pure air and fresh food are essential. I speak of pure air first, because if defective in quantity or highly vitiated in quality, respiration, and therefore circulation, and so life itself, must quickly cease.

Numerous analyses have been made of the atmosphere and yet it has remained an undetermined question what
is the exact constitution of a model atmosphere. In some instances indeed chemistry would have declared an atmosphere loaded with typhus poison to be perfectly healthy; but, as has been already hinted, if this should be of an animal nature no better could be expected. And as regards food it is rather a happy thing that human beings guided by their instinct had learned to live before, by their judgment, they tried to examine into the nature of the food they lived upon. The once mighty protein is now numbered with the things that were, and although the fact that gelatine is in nutritious remains just where it was, no good reason has ever been offered as to why it should be so. Besides it is quite certain that human beings may not only exist but even flourish upon food which at first might appear to be incapable of supporting them. We are sadly in want of a little knowledge about the constituent of a model diet, and I am not inclined to look upon the elaborate investigation, if so well detailed in Liebig's Letters, as deciding the point. It is very well for him now that beans bacon, pears & pork, much other popular harmonies
in diet have become matters of domestic economy. Very well, I say, to come forward now with the reason why such articles of diet had been blended; but the fact stands where it did, namely, that people unskilled in chemistry proceed intuitively upon chemical principles in the selection of their food.

The variety of substances used as food by mankind is very great, but yet they all come under one of two great classes,—namely, the azotized and the non-azotized. The former apparently designed to furnish new material in place of the muscular and other highly azotized tissues of the body, which are constantly wasting; the other class designed to supply material for combustion by the oxygen which is absorbed at the lungs and thereby to produce animal heat. And there is no doubt but that chemistry may yet afford much assistance in determining the presence or absence of various salts, alkaline and earthy bases which under particular circumstances appear to be deficient or otherwise in the blood. In making this statement I advert chiefly to those instances in which it is asserted that scurvy may be prevented by keeping up the supply of
potash salts in the food. In the alimentation of the body then, in order that the highest health may be attained, it is necessary for us to take advantage of instinct, judgment, and chemical investigation; and wherever by comparison of the analyses of the tissues of the body and of the food intended to feed them, it is seen that particular constituents are required in addition to those already present we ought always to adopt measures for supplying these. One thing more however I would particularly urge in regard to alimentation, namely, that every hint afforded to us by the arrangements of nature ought to be considered of the highest value—it is quite evident for example that the tissue and blood of one animal ought to be, and certainly are, the most perfect nutrient of similar structures in another.

Sugar, oil, and albumen are the principal constituents of human food; and I would once more point to human milk and human blood as the recurring guides according to which our food should be regulated. With regard to the changes which these, as well as the saline and other components of the food undergo during the process of digestion
Our knowledge is still in so unsatisfactory a state that it would be fruitless to enter upon their discussion. This much however may be affirmed, namely, that the saliva, pancreatic and gastric juices, as well perhaps as the biliary and Brunnerian secretions act in all probability as ferment upon the organic materials of the food, the solution of which must not be looked upon so much as the result of the solvent power possessed by any acid or alkaline fluid, as the effect of what for want of a better name we term an agent of catalysis. It is indeed a remarkable fact that solution and disintegration should be effected by this power more readily within the body than could be done in a chemical apparatus by the action of powerful acids at a boiling temperature. This dissolving power is possessed by the elementary mucous surface of all animals down even to the polyps: but, as is well demonstrated in these animals when they swallow one another in an attempt to obtain some prey, the dissolving power acts upon the dead but not upon the living.
How much of the meting which takes
undergo after death can fairly be as-
dcribed to the solvent action of the fluids
in which they were bathed whilst living,
it is not easy to determine. The juice
of flesh is commonly believed to be acdc
in its reaction and this might have some
effect if its qualities remained the same
after death. But, as I previously men-
tioned, the whole subject of organic
chemistry is in such an unsatisfactory
state that I would not consider myself
justified in attempting to base any
theory in the way of a practical explanation
which might only tend in some degree
to mislead other people in time to come,
upon any data furnished by it. The
experiments of Bernard appear to me
masterly in the extreme, and although
I cannot but hope that some good may
come of them, yet it must be said
of them, as of all experiments similar
to nature, that they have been conducted
upon the lower animals which we
must suppose to be little susceptible
of the mental emotions that in human
beings might produce changes of the
most vital consequence. I leave this subject therefore to proceed at once to the last division of this essay in which I shall consider the circumstances that cause the vital influence to surrender its government and the human organism to be once more melted and resolved into mineral matter.

From the observations that have been made in the preceding pages regarding the origin and maintenance of the human frame, one great principle has been well established, namely, that the circulation of a nutrient fluid throughout all parts of the system is perfectly essential to the integrity and even the existence itself of every organ & tissue composing it— with the first movement of the blood life begins in earnest, with its final stoppage life departs. Now while it must be acknowledged that death is in every case associated with complete stoppage of the circulation, it is equally to be confessed that the mode in which this change affects the continuance of life remains quite unexplained. After death the blood is
just as much within the compass of the body as it used to be and yet the body is dead. The tissue appear almost as perfect as ever and yet their purpose is extinct: with all appearance of soundness, the blood and the tissue manufactured from it are quietly passing into decomposition and will soon be resolved into the earth and air from which they were borrowed. But after all attempts to explain, how the link of connection between the visible and the invisible world becomes dissolved the facts remain just as they were: namely, first, that when the blood ceases to circulate the body ceases to live; and second, that although the mechanism of death appears extremely simple, yet the powers spiritual and temporal that render it inevitable are frequently as inscrutable in their action as they are fatal in their effects.

As it is commonly asserted that circulation may begin to cease either at the heart or at the lungs, it will be better perhaps to talk of death as beginning at one or other of these organs.
than as affecting the system generally. There is indeed remarkably good reason for laying so much stress upon the stoppage of blood at the heart and lungs, for through these every drop of blood in the body must be transmitted at least once in every three minutes, although probably in much less time. In considering therefore the various modes of death, reference should always be had to the manner in which these organs may be influenced both directly and indirectly so that they will refuse to perform their functions and first them of death beginning at the lungs.

Keeping in view the aerating function of these organs and likewise the purpose for which the blood is transmitted through them with such freedom it must at once be obvious that any diminution in the their power of aerating the blood in whatever way produced must effect a corresponding diminution in the facility with which the blood will pass through them. It must always be remembered that the blood is sent to the lungs for the express purpose of being
brought in contact with a fresh atmosphere, and if it does not undergo the desired change it simply remains and refuses to be forced through them, even although the heart may make powerful efforts to drive it. In treating this question of the commencement of death at the lungs it is of small consequence in a practical point of view to enquire why the blood refuses to move on; but it is of paramount importance to ascertain in what way the aerating power of the lung may be greatly diminished or even entirely abolished. The causes may be conveniently arranged under three heads: first those which offer an obstacle to the entrance of air; secondly, those which disable the mechanism by which the supply of air is renewed; and thirdly, those which diminish the aerating surface of the lung itself. These causes are mentioned separately as being each of them quite capable of producing the dreaded result, but at the same time it is also quite possible that two or more of them may act together and so complicate the matter. Physicians however seldom
make mention of the more complex modes of death; it is difficult enough to understand those cases in which one cause only is at work.

Among the causes which obstruct the entrance of air, some are organic, some merely functional. Of the former may be mentioned Laryngitis and Croup with their varieties; of the latter spasm of the Glottis from reflex or directly transmitted action, are excellent examples. But at any time the most simple mechanical means will suffice to prevent the entrance of air into the lungs, and to produce death: it is indeed a marvellous thing to see how dependent we are upon the most trifling circumstance for our existence so highly valued, and this ought to remind us of our frailty.

But even when the finest entrance is afforded to the atmospheric air into the lungs it may be incapable of effecting the necessary change. It is remarkable that these organs do not possess any power of inducing the air to enter them. They are in fact perfectly passive within the thoracic cavity, and follow it, walls
in every movement according as it capacity changes during inspiration and expiration. And although I do not for one moment suppose that any one versed in the science of physiology could mistake in regard to the terms inspiration and expiration, yet as the popular idea is apt to obscure the recollection of first principles, it may be as well to state that the air does not force its way into the lungs, but is simply induced to enter them and to renew the supply clear down to the air cells merely because the thoracic cavity is enlarged by the forcible contraction of its muscles: the elasticity of the thoracic parietes and the elasticity of the displaced viscera as well as that of the displaced thoracic contents itself, enough to expel the air once more from the lungs. It must be perfectly obvious then that if the muscles of respiration should become either paralyzed as in poisoning by Conium, or thrown into a state of tonic spasm as in tetanus, the renewal of air within the lungs will almost entirely cease. The causes which paralyze the muscles of respiration almost invariably act by exhausting or by pressing the irritability of the spinal cord and Medulla oblongata: the exhaustion being sometimes attended and sometimes
unattended by suspension of sensory sensation and consciousness, that is to say by coma. I mention this pointfully because many no doubt believe that whenever the patient is comatose the loss of sensibility in the brain has reality something to do with suspension of respiration more than as a mere attendant upon it; this however is a mistake. Occasionally when coma is produced by pressure on the brain or by the effect of some poison in the blood such as mead, the irritability of the medulla oblongata becomes at the same time oppressed, and paralysis of the respiratory muscles may result; but here the paralysis takes place because the medulla does not respond to the complaint of the pneumogastric nerve and not because the patient is insensible. Indeed if further proof were wanting that suspension of the respiratory movements is an event independent of coma there is the evidence to be drawn from the action of hemlock which does not itself cause any confusion of head but simply produces muscular paralysis beginning at the extremities and affecting the muscles.
of the chest last of all. Of course it produces death by asphyxia according to the ordinary mode of stating it; and it is not until imperfectly aerated blood begins to circulate through the brain that coma supervenes. Aconite is another example very much of the same kind although perhaps a less decided one as being attended by peculiar numbness and tingling. I have said that causes which paralyze the muscles of respiration almost invariably act by depressing or exhausting the irritability of the Spinal Cord; but in a few instances it is possible for this effect to be produced by the direct agency of some poison such as Aconite applied upon the surface of the thorax—here the best proof that the influence exerted is direct springs from the fact that the respiratory muscles which are usually affected last of all become in this instance first paralyzed. The same observation with regard to the unimportance of mere coma upon the suspension of thoracic activity applies with equal force to the action of poisonous drugs such as strychnia and others which act as stimulants to the brain and spinal cord.
producing violent spasm of the muscles of respiration and therefore suspending the action of the lungs.

I would certainly not place so much importance upon the error of believing cerebral excitement or insensibility to have any influence in suspending respiration were it not that indifference to one physiological fact very often leads to disregard of others: and if we get into such bad thinking habits as to forget for a moment that people are really in a state of coma during sleep, we may soon be brought to disregard circumstances of far more vital consequence. Herewith then would I turn upon what I believe to be the truth. Death does not begin at the brain in any case whatever; but if we are determined to use this expression with respect to the remote rather than to the actual cause then let us speak in future of death beginning at the medulla alone. It is unnecessary for me to notice how perfectly essential to respiration the medulla oblongata really is, or how by simply pricking it in the angle of separation between the posterior median fasciculi
death instantly follows—in this case how ever not merely by asphyxia but by a shock also affecting the heart.

Passing now to the third set of causes which produce stoppage of circulation at the lungs, namely those which diminish the aerating surface of these organs. I cannot deny that some at least appear to me difficult to comprehend and therefore difficult to explain in a satisfactory manner. One would imagine that in pneumonia for example since a large amount of liquor lanae and blood is poured into the tissue of the lungs and a considerable portion of its breathing surface by that means rendered useless, the residual part of the pulmonary tissue would still bear as large a proportion to that of the blood as in the case in health. But what is the fact?—The respirations increase in number to such a degree that they have even reached fifty in the minute and the patient appears almost to be suffocated. It may be said that solidification of the lungs in some parts may prevent their action in other parts yet unaffected. I sometimes think that a person
destitute of medical education would be more likely to take a rational view of all this than one well versed in the doctrines of physiology. An uneducated man would attack the difficulty at once by simply comparing the size of the lungs with that of the rest of the body; and no assertion on the part of any physiologist that the heart gives to and receives from the lungs the same amount of blood that it does with the rest of the body would at all affect his process of reasoning. He would either simply assert that the physiologist was deluded, or might at once get at the kernel of the difficulty by supposing, what moreover is the truth, that the blood which is sent to the lungs makes its transit more rapidly through the system. Still the amount of lung which is occupied in some cases of pneumonia cannot well account for the excessive dyspnea so often witnessed, and therefore ought to receive some additional explanation. It is much more easy to understand how bronchitis may act in diminishing the aerating power. Even a fourth or a fifth part of the air cells belonging to one
bronchial tube may be cut off from communication with the atmosphere by a few of the smaller tubes becoming plugged up with thick mucus. It is in this way in fact that partial carminification of the lung occurs in as many cases of bronchitis as observed by Bairdner; and the future progress of these cases which so often result in unavoidable Emphysema is such as to render the lung much more easily disabled by a future attack of inflammation. I may here remark that Bronchitis is a much more serious affection than it would appear to be. Very often, especially in the old, strength is wanting to bring up the mucus, and so the patient is never free from the risk of obstruction to the entrance of air. Pleurisy, especially when the effusion is rapid, may greatly diminish the aërating function of one or both lungs and the modus operandi is more evident in this case than in that of bronchitis. But on the other hand it is wrong to talk of the lungs as suffering from compression unless the fluid accumulation be very great indeed. For it must be remembered that the lung is a contractile structure.
and only wait, for the interposition of a layer of fluid between the pleura pulmonalis and pleura costalis in order that it may collapse. The danger will be all the greater if, whilst the lung is in the collapsed state, lymph should be exuded into its texture; and yet I question much whether the amount of collapse that would be required to suspend respiration could permit a state of system sufficiently active to allow of the exudation of lymph. But of all the causes that act in the way already mentioned, none perhaps exerts its influence so manifestly as pneumothorax. Whether this be caused by a fractured rib perforating the lung, or by an aperture in the thoracic wall, the result in permitting the lung to collapse is the same.

In reviewing the causes which diminish the aeration surface of the lungs to such a degree as to prevent the circulation of blood through them, I have to remark that tuberculosis, pneumonia, and acute pleurisy ought to be looked upon rather as diseases which might produce death beginning at the lungs.
than as actually producing it. In every case in which the breathing surface of the lungs is diminished to so great a degree as would quickly prevent the circulation of blood through them, the medulla oblongata becomes so much exhausted by the supply of deteriorated blood sent to it, that the muscles of respiration cease to act; and so of course the stophpage of circulation at the lungs ought in reality to be referred to paralysis of the medulla oblongata. There is but one thing more that I would wish to have decided, and that is why the blood ceases to pass through the pulmonary vessels when air no longer comes in contact with it. Venous blood is denser than arterial and perhaps its specific gravity might be a cause of delay. Does the carbonic acid with which it is charged produce any chemical action upon the delicate tissue of the lungs? It is impossible to answer questions of this kind, because we are not provided with proper data. Perhaps the venous blood may act as a relaxant or rather a paralyzed of the capillary vessels in the same way that it suspend the irritability of nervous matter.
We know that when the irritability of capillaries becomes exhausted, they become dilated, lose their tone, and cease to transmit their fluid contents. Why the presence of oxygen instead of carbonic acid in the blood should stimulate and invigorate the vessels it is not for us here to consider; suffice it to say that it does so. The sluggish circulation which I have already hinted at, which I believe occurs in inflammatory affection, even in those parts which are supposed to be unimpaired, is probably due to the increased vital affinity which during the progress of inflammation is supposed to subsist between the circulating blood and the tissue through which it passes. It will not become a matter of consideration whether circulation at the systemic capillaries may not be impeded by affinities very much of the same kind.

Taking a general review of the manner in which the circulation of blood ceases at the lungs, I have to remark in conclusion, first that an explanation of the obstructing has never been afforded, and secondly that as far as I can understand
the matter, the continued renewal of atmospheric air within the lungs is one condition but certainly not the only one necessary for facilitating its transit.

Having stated so much in regard to death beginning at the lungs I scarcely know how most advantageously to treat of death beginning at the heart. It is commonly said that the heart may stop either from loss of blood in which case its cavities are found empty after death, or from asthenia or loss of nervous influence when the cavities are found distended. Every one knows that people may faint either from loss of blood or from exhaustion, and probably the statement above made is sufficiently explicit. In regard to stoppage of the heart from loss of blood as it generally occurs in individuals whose muscular irritability has not been exhausted by long continued disease it is only reasonable to suppose that the heart should retain its excitability for quite a great a length of time as the blood continues to enter it more especially since the current of the circulation is directed away from the heart.
Moreover as the heart contains among its fibres enough of nervous matter to make it worthy of being considered even a separate nervous centre, it is possible in this way to account for its comparative activity under circumstances in which organs such as the voluntary muscles which depend upon the brain would become exhausted. In this variety of death the brain spinal cord sustain a sudden shock from the diminution of arterial supply. But in death by asphyxia it would be often rather difficult to say whether the detachment of nervous influence had paralysed the heart or whether the paralysis of the heart had suspended the nervous influence. No variety of death is more common—none I think so common as death by paralysis of the heart. Nearly all inflammations of the abdomen have a tendency to cause death in this way, but if I were to attempt an enumeration of diseases and give even a slight sketch of their phenomena the limits of this essay would much exceed what they ought to be. But before leaving the subject entirely it may be as well to enquire why does the heart stop?
and to have this question properly answered it is necessary to look at the heart itself. Sometimes its muscular substance is partially converted into fat, some of which may perhaps be deposited by the blood vessels, but a great part no doubt by the degeneration of sarcal substance. We are apt to say, on looking at such an organ how is it possible for this individual to have lived so long with such a heart? But another question equally interesting immediately suggests itself—how much longer could the patient have lived and how more fatty might the heart have become and yet continued to perform its function? I do not for one moment suppose that fat is a contractile tissue, but it remains to be proved that the fat observed to exist in fatty heart and supposed to be produced from sarcal substance is really identical with ordinary fat, and does not possess properties differing but little from those of muscular tissue. For in some cases the amount of structural change is so enormous that it is a matter of the deepest surprise how contraction could
have taken place at all. But granting that the presence of fat in the heart is a sufficient reason for the stethoscope of that organ, what shall we say to the case in which the heart is found to all appearance perfectly healthy? That its action has ceased is a fact—and that its cessation has been the cause of death may be also true, but the cause of this cessation is what we may seek for in vain. The influence of digitalis, nicotine, oxalic acid, and other poisons paralyzing the heart appears exceedingly difficult to explain. Of course like other difficulties of the same kind it is usually referred to the sympathetic. The intellect remains unclouded, and the patient feels himself dying as it were by inches. If the poison acts through the blood then perhaps it may paralyze the heart by affecting the ganglionic masses within it; but if this be not the explanation, it is almost useless to speculate further on the subject. The power of mental emotions over the heart is as remarkable as it is well known; but why merely because the mind is affected, the heart's action should cease is scarcely
to be accounted for. The cerebral excitation may no doubt act centrifugally through the ganglionic system and cause a species of disturbance in the muscular fibres of the heart that may either excite them into vigorous and transitory contraction or may suspend their power at once. Concussion of the brain may be so severe as to destroy at the same moment the irritability of the brain and heart; but in this case insensibility takes place at once. In comparing the three modes now mentioned in which paralysis of the heart takes place, it is to be observed first, that paralysis may occur so gradually that the brain remains perfectly undisturbed and the mind elaborates its last thought as the stimulus of the heart reaches it for the last time; secondly, violent mental emotions paralyze the heart and as the blood ceases to supply the nervous centres the paralysis becomes general and the patient dies; thirdly, under the influence of concussion both the heart and the nervous centres may suffer such irreparable injury that the functions of both become at once suspended. But if the concussion
be not immediately fatal. The heart stands it out better than the brain, and after a few feeble contractions life becomes extinct.

To suggest any explanation of the mode in which disease throughout the body influences the heart seems almost hopeless task. In some instances, however it would appear as if the blood suffered such deterioration in certain parts of the body, either by changes which take place in those parts or from the absorption of poisonous matter, that as soon as the blood reaches the heart its ganglia seem to be paralyzed. What poisons they are that act in this manner it would be a difficult task to ascertain.

From all the pathological investigations that have hitherto been made it is quite impossible to extract an answer to the following question—to what degree may structural change occur in the body without being followed by death as the inevitable result. In some post mortems it would appear as if disease must have worked very hard
to expel vitality from the system; for almost every important organ has been found apparently ruined by disease. The brain melted, the liver filled with soft cancer, and the intestines riddled. In other instances it seems quite a puzzle to ascertain what could have killed the patient, and it follows upon this to enquire—does vitality always exist in the body until the tissues become unfit to carry on the functions of life?—or does it leave them at its own time whether they be healthy or diseased?

Taking into consideration the subject of death in its various points of view, and under the belief that no one will ever ascertain the law by which vitality is suspended, I would finally conclude these remarks by an abstract of its conditions.

First, the existence of a dete
erated constitution in the blood, such as will either directly or indirectly hinder it from passing through the body—for care is taken that as soon as the blood is useless to the body it circulation is suspended. Second, the suspension of
the heart's action which may be effected either directly or indirectly; and so the removal from the tissues of the only material which can maintain their life.

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